AMERICAN JOURNAL OF OPTOMETRY

VOL. 9 JUNE, 1932 No. 6

FIELD TESTING*

J. WOLFF, O. D., F. A. A. O.
Spokane, Wash.

In our work as optometrists we frequently encounter cases of such a nature as might completely baffle the most painstaking efforts if it were not for the fact that we had some means of ascertaining what we might term under-the-surface conditions. While ophthalmoscopy lends itself most admirably to an examination of the media and fundus in so far as our ability to see surface evidences of pathology is concerned. yet there may exist changes either so minute in character as to be indistinguishable, or of an obscure nature, involving principally the underlying tissues, therefore lost to the sight of the examiner. It is that particular phase of our examination which may uncover hidden conditions that I desire to bring to the attention of this assembly, and point out a means whereby our services may be vastly enhanced. I am speaking of those abnormal processes which may take place within the eye, the visual pathway and in fact, the entire human body. The presence of pathology may be disclosed through one of the most sensitive and exacting methods of examination known; that of visual field testing. In making these tests there are certain psychological, as well as physical, factors to be taken into account in order that the greatest possible accuracy may be attained; because diagnosis and analysis are very much dependent upon these physical and psychological factors a proper understanding and observance is important. In the early history of field testing it appears that one of the chief reasons for the development of such tests was for the purpose of finding the cause of amblyopia. Von Graefe in 1856 published the very first paper upon this subject. Later articles began to appear from such men as Aubert, Foerster, Muller, Schoen, Pauli, deWecker, Herschberg; practically all old masters in ophthalmology. Herman Knapp was the first to publish an article on field testing in our country. The more recent students of this subject who have given to the world of their unselfish devotion

*An abridgement of the material presented before the American Academy of Optometry at Omaha, December 15, 1930.

to the cause are Haitz, whom it will be recalled published a series of charts for use with the ordinary stereoscope for the detection of fine central and peri-central scotoma. Luther C. Peter, M. D., contributed a book entitled "Principles and Practice of Perimetry"; the second edition appearing in 1923. Ralph I. Lloyd, M. D., in 1926 published a book entitled "Visual Field Studies" and was one of the advocates of making these tests on the stereo-campimeter. These two authors deserve special praise for their contributions to this science; their work being a valuable source of information and reference. In 1927 H. M. Traquair, M. D., Edinburgh, published "An Introduction to Clinical Perimetry," which is indeed a very remarkable book. The principles involved in all of these works are essentially the same. Traquair, however, goes to greater length in discussing some of the fine points of physiology, anatomy, anatomical relationship, and apparatus for testing.

And so, we see the subject is not a new one, although quite foreign to vast numbers of practitioners on the eye. For a number of years it was thought that the only useful purpose of field testing was to be able to follow up certain pathologic processes, thereby to determine whether a condition might be progressing, declining, or at a standstill, or for locating the site of defects due to trauma, tumors, etc. Still later it became known that certain infectious and toxic conditions of either a localized or systemic nature could be uncovered through field tests.

Today one of our own men out in San Francisco, namely, Dr. T. A. Brombach, has, after a number of years of experimenting in this direction, developed and classified certain characteristic field signs for a number of types of low grade infection and toxemia. My own experience in this work has led me to the conclusion that there is a great new field here for the optometrist.

The future of our profession holds out certain promises upon which the foundation of a new premise in optometry rests. It is in the early recognition of pathologic processes either systemic or ocular that we must educate our optometrists for here lies a weak link in the chain of optometric progress. In the condition of the fundus oculi is to be found the state of health of the human being; therefore, we like to speak of the eye as a barometer of the health condition of the individual. Referring such cases as require the services of other professions will sooner or later establish a co-operative spirit of great importance, and here lie tremendous possibilities for service, prestige and advancement.

Dr. T. A. Brombach's experiments for the most part cover a certain restricted (or rather special) phase of field testing; that of the color fields, for indications of toxic conditions arising principally from coffee, tobacco, and dental infection. In this work he attempts to correlate the interlacing, overlapping and reduction in size of color fields with the various stages of intoxication, and through a series of tests gradually eliminates all unimportant factors, thereby bringing to the

surface the predominating and causative factors. He says he is able to prove beyond question a definite relationship existing between the overlapping and interlacing effects of color fields and the various stages of intoxications. Here are Brombach's classifications:

DIFFERENTIAL ANALYSIS OF INTOXICATION AND AUTO-INTOXICATION

	Characteristic Color Field Perception		Stimulus and Measures of Ductions Relative		Size of Field Red, Green, Blue	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
Temporary Intoxication Stimulative Type	Normal	Green interlacing or overlapping Red	Low	High	Med.	Large
Temporary Intoxication Depressive Type	Normal	Red interlacing or overlapping Blue	Low	Lower	Small	Small
Auto-Intoxication Primary Type	Green interlacing or overlapping Red	Green interlacing or overlapping Red	Med.	Med.	Med.	Med.
Auto-Intoxication Secondary Type	Red interlacing or overlapping Blue	Red interlacing or overlapping Blue	Low	Lower	Small	Small
Auto-Intoxication Focal Infection Type	Green 1/3 size of Red or missing	Green 1/3 size of Red or missing	Low	Low	Small	Small

NOTE: In the stimulative and depressive types of intoxication it seems generally understood that exogenous poisons (those introduced into the body) such as alcohol, tobacco, coffee, tea, etc., are responsible for the condition presented. This embraces the first two types shown above.

Third type caused by toxins within the body (infected tonsils, teeth, sinus, intestinal disorders, etc.).

Fourth type caused by toxins allowed to run for years as above (Scotoma often present).

Fifth type is auto intoxication but the difference is great enough to give special name caused by ulcerated teeth, pyorrhea.

In the last three classifications we are dealing with conditions brought about from endogenous poisons (or those which occur as a direct result of bodily pathology).

Dr. F. V. Simonton, a former professor of dentistry in the University of Southern California, has carried on a number of experiments along these lines both upon himself and some of his patients and commends the work of Brombach. Dr. Simonton in commenting on his experiments says: "The consistency of the tests throughout are notable. Correlation of interlacing with nicotine toxemia was impressive. The failure of fatigue, good and poor spirits, calm or nervous head-

aches, and metabolic disturbances, acid and basic diets to affect color fields are important."

Dr. Brombach's own summary and conclusions follow:

1. Color field and duction analysis must be made at different hours of the day.

2. If the introduction of a toxic agent from without is eliminated, a seven to eight hours' sleep will usually indicate a toxin free field.

3. Patients working at night or arising early may present the various stages of temporary intoxication in the forenoon.

4. There is no typical field for a specific type of intoxication. The effect of color field interlacing and the relative size of the field is similar in tobacco, coffee and other etiological factors.

5. It is obvious that before final conclusions for or against contemplated measures of relief are formed, it is of vital importance to ascertain whether functional results recorded are exaggerated, diminished, or neutralized by the effects of irritating toxic agents.

6. The variations in response during the course of corrective treatment also the permanence of the final results obtained, can be directly explained in many instances by the effects of the various stages of temporary intoxication.

7. The variation in recording visual acuity at different hours of the day, for which there appears to be no pathological explanation as determined by a thorough exploration of the fundus oculi, may depend or may be associated with some state of intoxication.

8. Fundus exploration in most cases of temporary intoxication are negative unless a toxic agent is introduced to overcome the always depressing effects of auto-intoxication, or focal infections.

9. After elimination of the etiological factor the change of the color field to normal will take place in a very consistent manner from the depressive to the stimulative and then to the normal or toxin free field.

10. A patient may be an habitual user of alcohol, smoke excessively, and yet the effect of one cup of coffee may be responsible for the presence of field defects indicating intoxication.

11. Regardless of the method employed in rendering relief for symptoms of ocular discomfort, color field analysis will produce positive evidence as to the progress made in the case.

12. As a differential analysis between exogenous and endogenous toxemia, impending and actual pathology, color field analysis offers to the profession interested in the treating and diagnosis of pathology visible evidence of chemical changes; to the dental profession material aid in the interpretation of X-ray indications of oral lesions and to the optometrist in co-operation with other professions a technical method of examination in preventive, corrective and hygienic service

in the conservation of human vision.

Methods of Testing; Equipment; Technic

For a number of years the perimeter or a black-board was the only type of field testing apparatus that one thought of for this work. Today there are two distinct methods in common use which demand the use of two types of equipment. The stereo-campimeter as its name implies is used stereoscopically and offers an excellent means of mapping out very fine central and paracentral defects as it intensifies fixation and effectively produces a magnification of the slate and therefore the defect. For testing the form field limits a different type of apparatus is required, and the ordinary perimeter answers the purpose quite well. In the Feree-Rand perimeter we have a piece of equipment that can be employed to uncover practically any type of field deficiency that may exist. In my own practice I like a large tangent plane for general purposes, it being necessary occasionally to resort to the stereo-campimeter for outlining very fine defects, or the ordinary perimeter for taking the form fields when these seem to be contracted. If one is to be completely equipped, he must have a stereo-campimeter, an ordinary perimeter, and a large tangent plane; or the Feree-Rand instrument may be used exclusively.

Cases Indicating the Need for Field Study

A study of the particular case in hand will usually answer this question. That is, the type, severity of symptoms or defect should suggest the probable causative factors, or source of difficulty. The ophthalmoscopic picture is, of course, often of great value as well as the case history—refractive and neurological findings. It is generally conceded that any case which cannot attain vision of 20/30 in at least one eye is affected with some manner of pathology. Frequently when patients complain of their vision blurring, and acuity tests indicate normal vision, there may be no need of further lens correction, ophthalmoscopic examination reveals no irregularities and it is difficult to place responsibility for the complaint; upon a careful exploration of the central field (macular area) with small colored test objects we find a relative scotoma, here then is a suggestion of glaucoma or infection from alcohol, tobacco, and possibly coffee, or tea or other forms of toxicant. Further tests should be made in the paracentral region and the blind spots should be carefully tested for extensions or enlargements. Here we have a definite, tangible means of arriving at a solution for the symptoms described by the patient.

Cases of incipient cataract should be carefully examined ophthalmoscopically as well as on field testing apparatus to make sure of the condition of the fundus oculi, as these tests may decide the advisability of operative interference later. Should fundus or nerve be sufficiently involved so as to preclude the possibility of vision after cataract extraction, our patient should be advised against the operation. All cases of myopia should be subjects for field testing, as such patients frequently possess choroidal and retinal defects of a malignant type.

Often the only indication of incipient defects of this character are field manifestations, or at least the ophthalmoscopic picture may be doubtful—especially before such lesions reach visible proportions. Before attempting ocular gymnastics in any case, a careful field test should be made in order to guard against the dangers of over stimulation and exertion, as it is believed damage may result in such cases.

Technique of Field Testing

An intelligent understanding of what is expected of the patient should be had before the actual procedure takes place. It is usually advisable to make a few excursions while the patient fixes the central spot, explaining that there is naturally a strong tendency for one to follow the test object but this should be strenuously guarded against. Periods of rest should be given frequently by having the patient close the eyes for a half minute at a time every two or three minutes, this will be helpful in insuring accurate results. Assuming that we are using a tangent screen or the stereo-campimeter, the test object should be moved from invisible to visible; *i.e.*, from without the field of discernment of the test object to the point of discernment) several times; then we should move the test object from visible to invisible. (*i.e.*, from within the range of discernment to the point where the object just disappears). If we are using colored test objects, we demonstrate the point where the color first appears when moving from invisible to visible and where the color first fades out or disappears when moving from visible to invisible. It is a simple matter usually to strike a fairly good average field dimension in this manner, or, if testing the blind spots, this method is likewise used. This entire procedure may be carried out very quickly, and we are able to judge quite accurately as to the patient's reaction. It is preferable when we are ready to commence our actual tests to move the object from invisible to visible and at a fairly rapid rate of speed, reminding the patient always to look at the fixation point, and watching that he does.

In testing the form or color fields we should be on our guard for hemianopsias, quadranopsias, re-entrant angles, ring scotoma, or flattening of the fields. In testing central vision we should observe carefully as to the presence of central or peri-central scotomata positive, negative, and relative; also the caeco-central scotoma. In making blind spot determinations there are three things to bear in mind and watch for: size of blind spot, finger like projections either above or below, enlargements for colors. Color field determinations are made by the use of colored test objects. Concentrically contracted color fields point to toxemia, infection, or exhaustion which is usually systemic. The greater the contraction the more severe is the condition.

Functional and Pathologic Fields

There are two general types of fields which differentiate between primary diseases of the choroid and retina.

If the blue field is contracted out of proportion to the red and

green, we have an indication of disturbance of the choroid and rod and cone layer of the retina. On the other hand, if the red and green are contracted with blue and form fairly normal changes in the inner layers of the retina and ganglionic axis cylinders are indicated.

If a scotoma of the macular region is positive, it is quite certain that the choroid is the seat of the trouble. If negative, it is probably situated in the ganglionic cell layers of the retina.

In choroid retinal disease one may find the red and green contracted as much or greater than the blue.

Any disease of the conducting elements of the retina (optic nerve, optic tracts, or chiasm) will affect green first, then red, and lastly blue.

Infections. In acute attacks of poisoning—wood alcohol, lead, quinine, etc., or where there is a strong pus discharge into the blood stream, the green field is the most markedly affected, then red; but in milder cases where the toxic condition is slight or in post febril conditions, the red shows a greater contraction in proportion to the green; for example, the red may contract ten degrees to two of the green.

Functional Nervous Fields

Hysteria. Circular, concentrically contracted fields and tubular fields are characteristic of hysteria. Very often the contraction will extend almost to the center. In some, the contraction will be in the form of the usual order for colors. The tubular type may be diagnosed easily by the fact that when the test is made at an increased distance from the screen, the size of the field will remain the same. In the normal field, a slight increase in distance from the screen will give an enlarged field.

Neurasthenia. The field of neurasthenia is known as a fatigue field and frequently results in the spiral form. Exhaustion and inability to concentrate with variable changes also mark the neurasthenic field.

Ophthalmic Migraine. Visual indications are amblyopia, scintillations, scotomata, and hallucinations. The scotomata takes various shapes and are often zigzag. The blind area may be in any part of the field or take in most all of it. It is usually to one side of the fixation point, but may include this area. The scotomata are of the fleeting type and usually last from five minutes to half an hour, and are followed by severe headaches.

Functional Non-Pathologic Fields. An investigation of a great number of cases having muscular imbalance indicate a characteristic contraction for the red and blue fields. When ocular gymnastics are given and the fusion reserves are improved, these fields always show a great increase, stimulation being an important factor.

Normal Fields in Elderly People. Those who have passed middle life generally show a contraction of the red and blue field unless their

occupation is such as to require unusual physical activity, and a good state of health prevails. The field limits vary according to the above factors.

Testing and Recording

In recording the findings of our tests it is customary to cross hatch all positive scotomata using vertical and horizontal lines. Relative areas, *i.e.*, scotomata for red, green, or blue are recorded simply by the use of horizontal lines; these areas are then outlined by colors representing the particular type of scotomata. (Figures 1, 2 below and 3, p. 36, are illustrative.) Occasionally one may encounter dim areas, spots

J. Wolff. Figure 1. Positive Scotoma.

J. Wolff. Figure 2. Positive Scotoma inside Relative Scotoma.

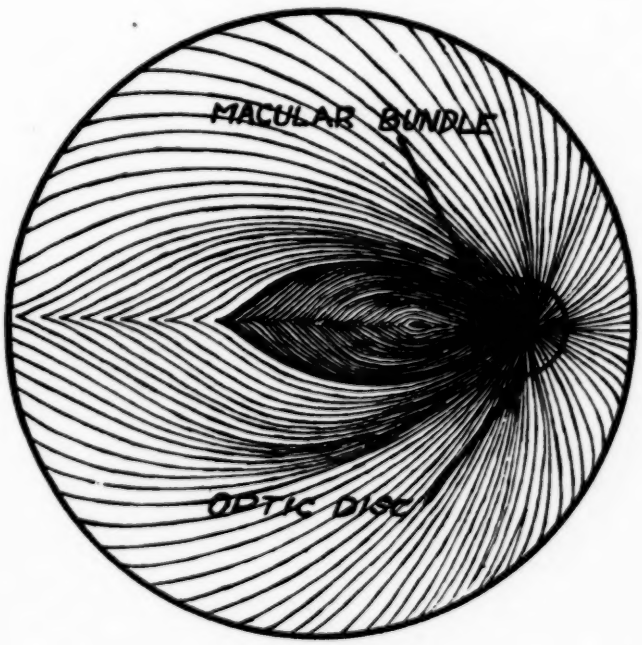
in which the object may be visible, but quite faded. These should be outlined as carefully as possible and recorded as "dim." Here is either a potential scotomata or possibly the point of a declining scotomatous area. Such cases should be kept under our observance and referred if the contingencies of the case seem to suggest this action. In fact, whenever a scotomatous area of any degree is encountered, the patient should be referred to such practitioner of the healing art as one's judgment would indicate to be most advisable.

J. Wolff. Figure 3. Relative Scotoma.

Anatomy of the Visual Pathway

A general knowledge of the anatomy of the visual pathway will help in understanding the various anomolies one may encounter in making field tests, and aid in the interpretation thereof.

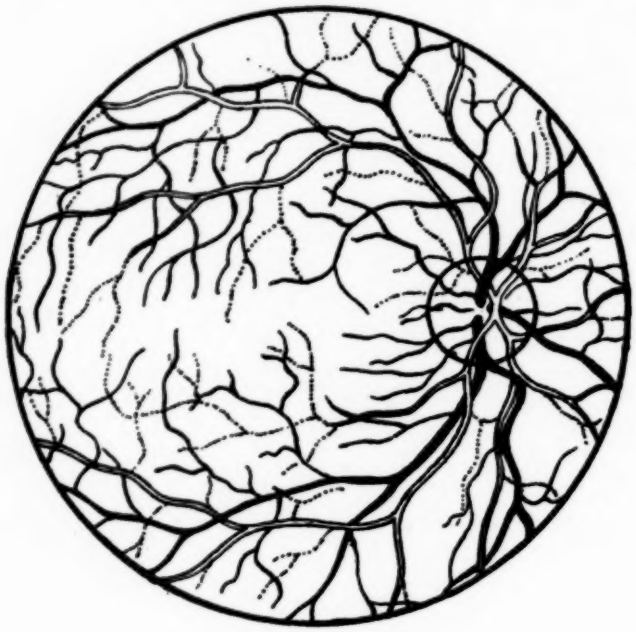
Figure 4 represents the anatomical arrangement of the nerve fibers



J. Wolff. Figure 4.

in the retina. This figure and figure 5 were reproduced after illustrations appearing in "Principles and Practice of Perimetry" by Peter.

The papilla is situated about 15° to the nasal side, and a little above the macular area. The nerve fibers radiate from the optic disc up, down, and temporalward. They arch and encircle the macular area which is supplied from the papillo-macular bundle of the optic nerve. A raphe (where the arched fibers meet) is formed in the horizontal meridian. An unequal affection of these two large bundles of arched fibers explains Roenne's nasal step, which will be explained



J. Wolff. Figure 5.

later under our discussion of glaucoma. Other glaucoma signs, which will be shown later, are also easier to understand if the anatomical arrangement of the nerve fibers are kept in mind.

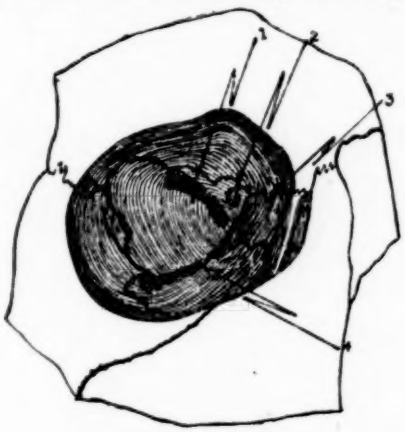
It might be well to remember that the retina is quite firmly attached at the optic nerve entrance and at the ora serrata. Between these extremities it is connected very loosely with the choroid. This will explain, in a sense, the cause of ring scotoma in retinal detachment from traumatism.

Figure 5 (above) shows the distribution of blood supply from the central retinal artery and vein. This distribution has a bearing upon the visual field loss in certain pathological conditions. It is well

to note that the blood supply follows quite closely the nerve supply of the retina, as shown in figure 4. The central retinal artery supplies all layers of the retina except the rod and cone layer which gets its nourishment from the choriocapillaris.

The optic nerve is composed of a large number of bundles of nerve fibers. These are covered by three sheaths—the dural, arachnoid, and pial. Between the dura and arachnoid, and the arachnoid and pia are lymph spaces which are continuous with the lymph spaces in the brain. Thus we have in intra-cranial pressure a distension of these spaces and a papilledema or choked disc. The optic nerve passes quite closely to the sphenoidal sinus and in addition to this fact, it passes through a small bony canal (optic foramen). These two factors make the nerve an easy prey to retrobulbar neuritis.

Figure 6 shows the close relationship existing between optic fora-



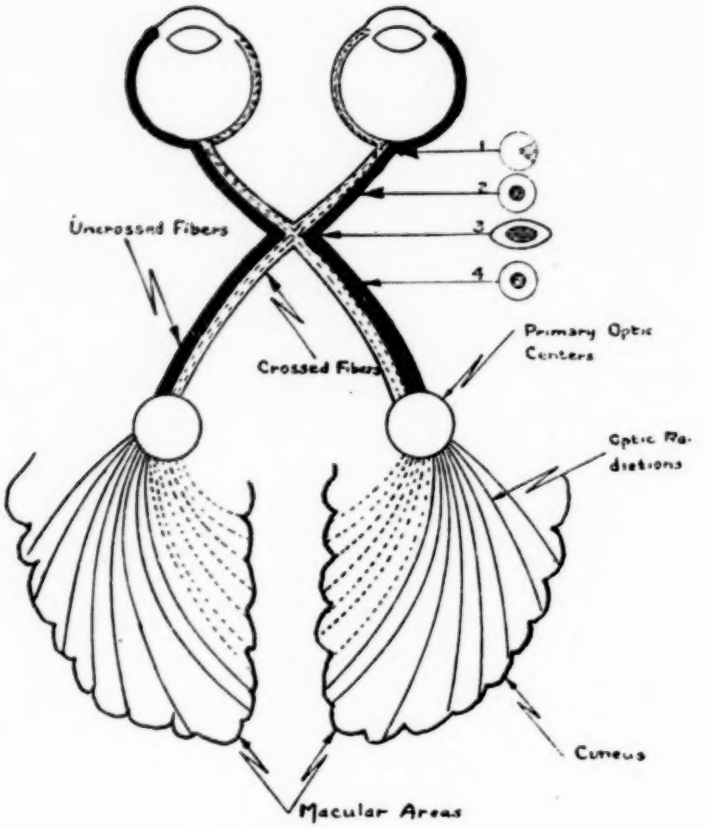
J. Wolff. Figure 6.

---

men, sphenoidal sinus, pheno-maxillary fissure, and ethmoid foramina. (1) Represents sphenoidal sinus; (2) optic foramen; (3) groove containing anterior and posterior ethmoid foramina.

The bundles in the optic nerve consist of three sets of fibers—the crossed, uncrossed, and macular fibers. The macular fibers, called the papillo-macular bundle, pass through the center of the optic nerve until they almost reach the eyeball, where they assume a wedge shape, and enter the eyeball on the temporal side.

Figure 7, p. 39, shows the position of the macular bundle from the disc back through the optic tracts. No. 1 shows the position of the bundle at the disc where the fibres enter the eyeball. About 15 mm. back of this position they take a central position in the nerve (Nos. 2, 3, 4) and remain so through chiasm and tracts. Some of the fibers from the



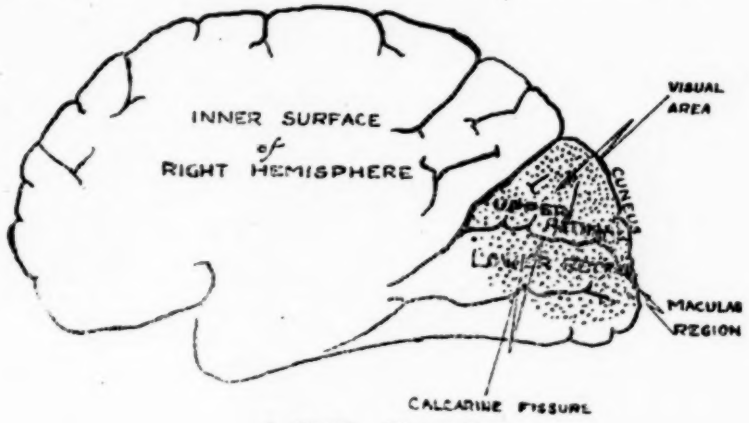
J.Wolff. Figure 7.

papillo-macular bundles cross at the chiasm and proceed through the tracts with the bundle from the fellow eye. This location of the macular fibers in the center of the optic nerve, tract, and chiasm explains why the macular area frequently is the last part of the retina to be affected.

The chiasm lies near or in a groove on the posterior surface of the sphenoid bone and is the location of the crossing of the optic nerve fibers. The crossed fibers are located in the lower part of chiasm and the uncrossed in the upper-outer part of the chiasm. (Bernheimer.)

The minute space around the optic chiasm is occupied by several important structures which are frequently the seat of disease. The sella turcica in which rests the pituitary body is posterior and directly beneath the chiasm. The anterior tip of the third ventricle is above;

and the internal corotid arteries lie on either side. If any of these structures become the seat of a disease, the chiasm is usually involved. According to Henschen the optic fibers maintain a definite relation throughout the optic paths and this relationship is maintained in the visual center where the optic fibers terminate (See Fig. 8). This position is known as the cortex of the calcarine fissure or cuneus.



J. Wolff. Figure 8.

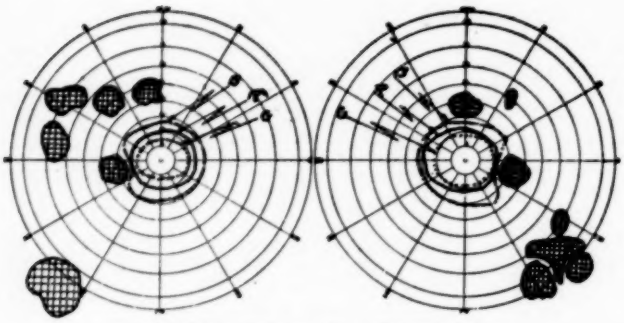
This area may be regarded as a retinal screen. The upper parts of the calcarine fissure are represented by upper retinal half and the lower by lower retinal half, while the macular area corresponds to the posterior tips of the hemispheres. The pole (posterior tip) is nourished by a different blood supply than the rest of the cuneus.

Diseases of the Intra-Ocular Pathway

Characteristics of choroidal and retinal defects. Choroidal defects, in general affect the blue field. Shrinkage of the red and green fields characterizes changes in the inner layers of the retina and the ganglionic fibers that make up the optic nerve.

Choroiditis. Incipient choroiditis may be uncovered by the use of the blue test object. Relative scotomata for blue will be found before absolute scotomata may be formed. These are usually multiple and may be distributed about the field; and are discovered by means of a field test before any ophthalmoscopic evidences may appear. There is usually very little or no contraction for form or colors in true choroiditis. If such exists, it is a sign that the retinal elements have also been affected.

Syphilis and tuberculosis are responsible for a large proportion of the cases of choroiditis. In cases of syphilis, improvement in the eye condition results under appropriate treatment. One of the principal signs of syphilitic choroiditis is the formation of scotomata in the macu-



J. Wolff. Figure 9. Choroiditis.

---

lar area of vision, which if positive it is quite certain that the choroid is the seat of the trouble. If negative, it is probably situated in the ganglionic cell layers of the retina. As the disease progresses, these spots will fuse into one another and form a ring scotoma. Under proper treatment, the ring scotoma will break again into smaller scotomata which will entirely disappear if the choroidal elements have not been too deeply involved. The field test is indispensable in these cases, both in the progressive and regressive stages, for it will show to the minutest detail the progress of the disease. This would be quite impossible with the use of the ophthalmoscope alone.

As previously stated, choroiditis is usually featured by multiple scotomata (See figure 9). If a scotoma is represented by a single blind area of large size, which takes on a wedge shape and widens toward the peripheral field, chorio-retinitis is indicated because the inner neuron layer of the retina is also involved, severing the connection of the fibers leading to the optic nerve, which causes a scotoma from the site of lesion to the nerve fiber endings.

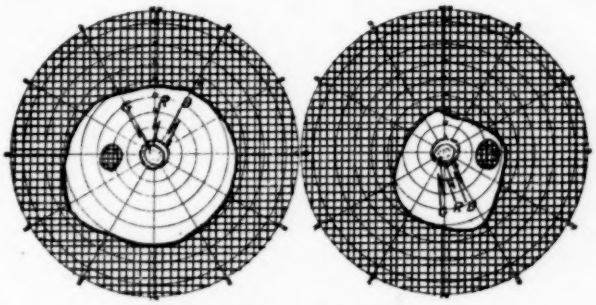
Retinitis is an inflammation of the ganglionic cells or nerve fibers of which the optic nerve is composed. Due to the arrangement and distribution of the blood and nerve supply (see figures 4, p. 36, and 5, p. 37) of the retina, any inflammation in the central portion of the retina or nerve will easily spread to the periphery, producing a general inflammation—thereby causing a reduction in the field for form. (See Fig. 10, p. 42, retinitis.)

One of the characteristic signs of retinitis is a diffused inflammation with a contraction in the form and color fields, and narrowing of the red and green fields in subdued light. Scotomata, when present, are usually negative. Central scotomata frequently occur but may be relative only to green and red.

Types of Retinitis

Syphilitic retinitis usually affects the choroid, as well as the retina, and symptoms are similar to choroiditis.

Retinitis pigmentosa is not strictlly a retinal disease, but one which involves both retina and choroid. It is characterized by a marked contraction of the form and color fields under reduced illumination. This is especially noticeable when using the blue test object. The blue field is affected in a much greater proportion than form, red, or green. A peripheral ring scotoma develops which, as time goes on, involves the paracentral, then the central field. Due to the close con-



J. Wolff. Figure 10. Retinitis.

---

nection between the choroid and retina, it is difficult to draw a sharp dividing line between choroidal and retinal defects, as a disease of one will usually involve the other, for the choroid supplies nourishment to the neuro-epithelial layer of the retina. Naturally in these affections the visual purple is involved. There is usually good central vision for colors, however.

Nephritic retinitis may show ophthalmoscopic signs of papilledema, hazy retina, macula-edema, and sometimes hemorrhages. The field signs are: (1) Contraction of form and color fields, principally for green and red; (2) enlargement of the blind spot; (3) indistinct scotomata scattered throughout any part of the field.

Retinal Detachment (Incipient). One of the first field signs is relative scotoma for blue. If the retina becomes separated, scotoma will become absolute. Sometimes the retina will become reattached. A careful study of the field through frequent tests will show the progress of the detachment or reattachment of the retina. A detachment may occur in any part of the retina. Detachment from a blow on the eyeball is liable to show itself around the macular region.

Figure 9 illustrates a multiple scotomata of choroiditis. Boy,

age 17 yrs., requiring an ocular correction: O. D. —5.25 sph.; O. S. —4.00 sph.; visual acuity 20/30 O. U.; fundus appearance, quite healthy. Note enlargement of discs, doubtless partly due to nerve affection, frequently an accompaniment of myopia.

Figure 10 illustrates the case of a girl, age 10 yrs. Frequent headache, mild conjunctivitis, and lachrymation. History of measles 3 months previous. V. A. 20/20 — O. U. No visual defect. Field test disclosed need of medical attention, which resulted in a diagnosis of nephritis. Here is an illustration of post-febril toxemia. Ophthalmoscopic appearance of fundus somewhat questionable.

Glaucoma

Definition—Glaucoma is the term used to designate that group of pathologic conditions which have for their distinctive feature, rise in intra-ocular tension.

Etiology of glaucoma, according to Elliot:

1. *Age*—It usually takes place between forty and sixty, although there is an infantile glaucoma occurring at from 15 to 40 years.
2. *Mydriasis*—Dilation of pupil tends to block up the iritic angle which obstructs the drainage through the pectinate ligament into the canal of Schlemm.
3. *Nerve, shock, and strain*—Fear, business worries, mental overwork, sleeplessness, etc., are ofttimes immediate factors.
4. *Febril diseases*—Cause toxic interference of the vascular arrangement of the eye and interfere with the secretory and excretory apparatus of the internal eye.
5. *Injuries*—Slight injuries of the eye will sometimes provoke an attack of glaucoma.

The signs and symptoms of glaucoma:

1. Subjective symptoms:
   a. Pain in eyeball.
   b. Corneal anesthesia.
   c. Halos around lights.
   d. Misty vision.
   e. Diminution of V. A.
2. Objective signs:
   a. Cupping of disc as seen by use of the ophthalmoscope. "Any excavation where margin reaches the disc margin at any point (except temporally) is a glaucoma excavation." "A short bend of a single vessel immediately at the disc edge is sufficient in every case for the diagnosis of glaucoma."—Jean.
   b. Pallor of disc.
   c. Congestion of retinal veins and constriction of arteries.
   d. Pulsation of retinal arteries, when slight pressure is applied to eyeball.

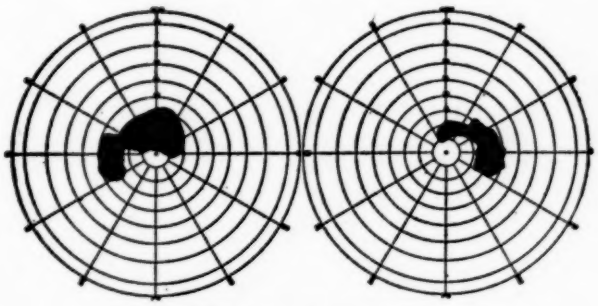
e. Dilation of pupil.
f. Shallow anterior chamber—iris appears to be pushed forward.
g. Circumcorneal injection (if glaucoma is of the congestive type).
h. Hardness of globe.

Note: Many of the objective and subjective signs of glaucoma may not appear for some time following the incipiency of this disease. The importance of field testing in these cases is obvious.

3. Field symptoms:
   a. Peripheral field loss.
   b. Nasal contraction.
   c. Seidell's sign.
   d. Bjerrum's sign.
   e. Roenne's nasal step.

There are two general types of glaucoma—the acute and chronic. In the acute type, the field contraction is due principally to vascular congestion. It is not usually practicable to make a field test during one of these attacks, but a careful field exploration should be made upon subsidence of acute symptoms. In all suspected cases of glaucoma a field test should be made and followed up by subsequent tests. It is hardly necessary to add that such cases should always be referred to an ophthalmologist.

Field Signs of Glaucoma

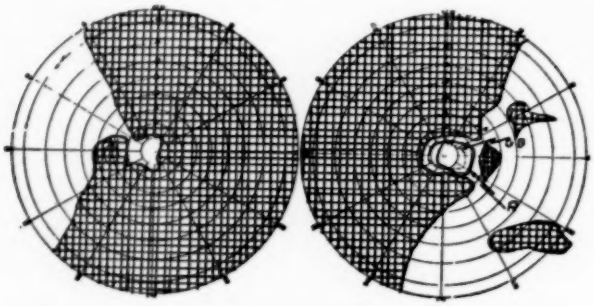


J. Wolff. Figure 11.

Seidel's Sign. Figure 11, right eye represents Seidel's sign, a narrow finger-like projection reaching out toward the macular area from either above or below the blind spot of Mariotte. This is one of the very earliest signs of glaucoma and should always be carefully looked for. This scotoma, as you will notice, follows the course of

the blood vessel stalks (See Fig. 5, p. 37) and is probably due to the engorgement of retinal veins. As pressure increases, this scotoma enlarges as shown in figure 11, left eye. If further enlargement occurs, we speak of this blind area as the Bjerrum sign. The red test objects, when used around the disc may show a relative Seidel sign before the absolute scotoma has appeared. This shows the importance of carefully testing around Mariotte's blind spot with colors.

Bjerrum's Sign. See lower part of blind spot (figure 12), left

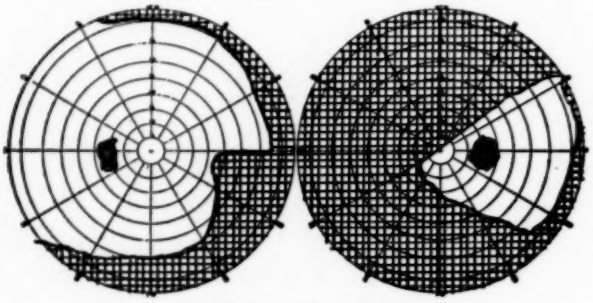


J. Wolff. Figure 12.

---

eye. Note particularly here the Bjerrum sign and how the scotoma has encircled the macular area; yet central V. A. remains O. S. 20/40. The right eye shows two incomplete Bjerrum signs V. A. being 20/20. See figure 4, showing how the macular area is supplied by a separate bundle of nerve fibers, which explains why central vision is affected last. This case taken from the writer's records did not show the classic sunken discs, which is the principal ophthalmoscopic sign of glaucoma; nor were the anterior chambers especially shallow. The field test was a valuable aid in ascertaining the extent and severity of this case.

Roenne's Nasal Step. Figure 13 illustrates in the right eye a



J. Wolff. Figure 13.

nasal contraction, and in the left eye Roenne's nasal step. Nasal contraction is due to the fact that the retinal vessels and nerve fibers are longer towards the temporal side of the retina than those to the nasal side, and are thus more susceptible to blocking. Glaucoma invariably shows a greater nasal than temporal contraction of the field. Roenne's nasal step in the left eye of figure 13 is easy to comprehend if one will refer again to figure 4 and note the raphe of the nerve fibers, leading from above and below the blind spot of Mariotte. The blocking of nerve fibers above the disc being greater than that from below (due to pressure in a glaucomatous eye), will cause a step-like formation as shown in the above picture.

Diseases of Optic Nerve, Tracts, Chiasm and Optic Radiations

The optic nerve from its earliest development can be regarded as part of the central nervous system. Its sheaths are a continuation of the meninges of the brain. The spaces between these sheaths are a continuation of the spaces between the sheaths of the brain.

The subarachnoid space of the brain contains a large amount of cerebrospinal fluid. This continuation of lymph spaces, sheaths and contained fluid of brain and nerve is of pathological importance, for therein lies a possibility of direct passage of disease from brain to optic nerve or vice versa.

After the optic nerve enters the optic foramen, it is exposed to dangers from several sources. A diseased ophthalmic artery may produce an undue amount of pressure upon it; it may be affected by syphilis through the bone covering; and may be damaged by means of an infection from the sphenoid or ethmoid sinus. The dural sheath of the nerve is connected with the bone at the optic foramen, which keeps the nerve from being displaced when tension is applied to it. If the nerve trunk swells, it interferes with the retinal blood supply and it is also subject to injury on account of the inelasticity of the fine scleral meshwork (lamina cribosa) which may choke the fibers in their passage through.

The causes of neuritis are fourfold, and can be conveniently divided as follows:

1. Ocular: Retinitis, choroiditis. As previously stated, the close relationship existing between optic nerve and retina, retina and choroid, a disease of either the retina or choroid may cause a secondary involvement of the nerve.
2. Orbital: Affections of sinuses, orbital cellulitis, skull malformations, orbital injuries and tumors.
3. Intracranial: Meningitis, tumors, gumma and sometimes epilepsy and general paralysis. According to some authorities, 90% of brain tumors cause choked disc.
4. Constitutional: Eruptive fevers, diabetes, tertiary stage of syphilis, influenza, diphtheria, tuberculosis, acute rheumatism, etc.

Other conditions causing affections of the optic nerve, are: Poisons

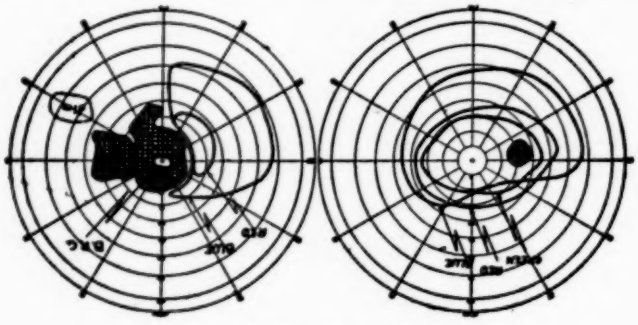
from wood alcohol, lead and foci of infection from tonsils, teeth, etc.

Ophthalmoscopic signs: Edges of discs blurred, relative increase in size of veins, arteries of disc contracted, and forward projection of papilla.

Field signs: Most common are: Peripheral contraction, central scotomata, relative for red and green or these may be absolute, sector-like defects; enlargement of the blind spot, earliest sign; and marked contraction of the green and red fields, another early sign. When monocular, the origin is usually orbital.

Field testing is one of the most important of all methods for determining a neuritis. Many a case of neuritis has progressed to a condition where permanent damage resulted because the ophthalmoscopic examination revealed no apparent pathology.

Fig. 14 O. D. illustrates a case of retrobulbar neuritis, orbital



J. Wolff. Figure 14.

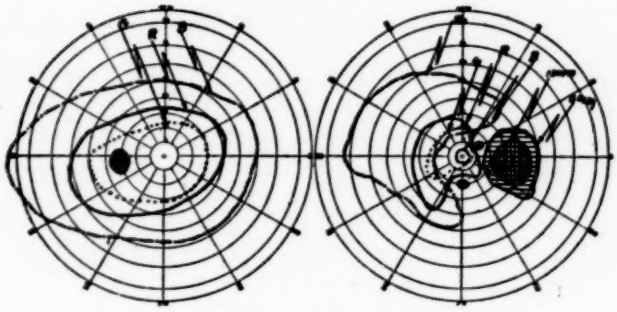
---

in origin. The Ophthalmoscopic examination was negative. X-ray plate showed marked intranasal thickening with possible interference of normal drainage of posterior ethmoid, and a definite pathology of right antrum. A subsequent field test of this area showed great improvement only a few days later, treatment having cleared up the ring scotoma and reduced the size of the blind spot. (See Fig. 15, p. 48, right eye.) This is a good illustration of ring scotoma, with macular area intact, showing how the position of the macular bundle in center of optic nerve (see Fig. 7, p. 39) preserves the macula from attack in the early stage of retrobulbar neuritis, due to orbital infections.

Figure 16 (p. 48) represents the field of a patient with sinus disease.

Note enlargement of blind spots, with a relative scotoma for colors around each disc. This is the most important diagnostic field symptom of sinus disease and dental infection. There is an interlacing of colors in each eye which is common to sinus and dental infection.

Chiasm. Pituitary disease is one of the principal causes of chiasmal



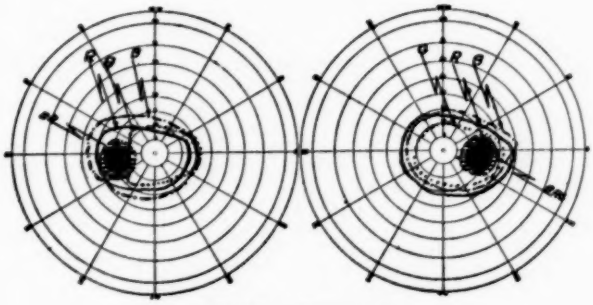
J. Wolff. Figure 15.

2. A temporal dent of the color and form field of one or both affections. Due to the situation of the pituitary gland (located below the chiasm), when enlarged, it must press upward impinging principally upon the crossed fibers which supply the nasal half of each retina, thereby frequently resulting in loss of the temporal half of the fields (Hemianopsia).

Various local factors enter into field losses which may range from comparatively small sectoral defects to hemianopsia. This is explained by the close proximity of parts, variety and direction of swelling, as well as the local resistance of the nerve fibers. If we divide the nerves, tracts and chiasm into the various segments according to the bundle arrangements, all sorts of possible combinations of sectoral defects may be planned.

Outstanding Field Signs in Lesions of the Chiasm:

1. The very earliest field alteration may be a hemichromotopsia (loss of temporal field for colors).



J. Wolff. Figure 16.

sides, this loss being in upper temporal quadrant.

3. Eventually this increases and may be met by a tongue-like process from the blind spot, producing the caeco-central scotoma, usually more advanced in one eye than the other, which finally proceeds to a complete half field loss in one eye and blindness in the other.

The blind eye of pituitary disease usually deviates outward.

Hemianopsias and quadranopsias may have for the seat of the disease, not only the chiasm, but also the optic tracts and optic radiations. Lesions of each have characteristic field differences which are ofttimes of diagnostic value.

Field Differences: The *distinguishing features* differentiating between disease of the optic tracts on the one hand and the optic radiations and visual cortex on the other, are as follows:

1. In the latter there is absence of the Wernicke pupillary phenomenon. This absence means that there is a normal pupillary response to light when directed upon the blind half of the retina.

2. There is no visible atrophy when viewed with ophthalmoscope if the lesion is back of the primary optic centers. This is of diagnostic value in chronic cases, as atrophy always results in chronic cases of lesions of the visual pathway between the primary optic centers and globe.

3. There is an assymmetry of homonymous fields which is said to be characteristic of lesions of the temporal and occipital lobes.

4. The macular area usually escapes in optic radiation and cortex involvement. Tract and chiasm lesions produce an hemianopsia which passes through the fixation area or very closely thereto, while the macular area usually escapes in invasions of the visual cortex.

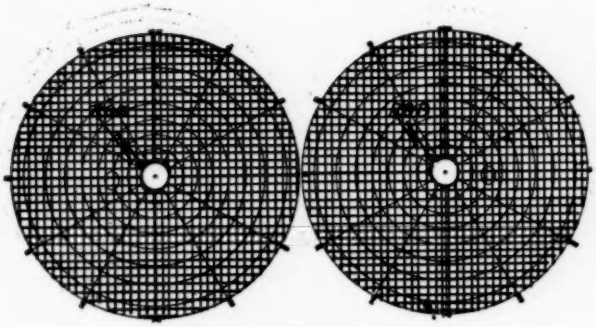
In diseases of the *optic tracts*, unless complicated by hysteria, choked disc, or papillitis, the fields in general show a complete hemianopsia, the maculae are usually intact, and the seeing half of the eye will probably show normal for form and color.

Hysteria and Neurasthenia. With a fairly good understanding of field signs in general, it might be well to consider some of the more intricate conditions arising as a result of functional nervous disorders; as these are the types of cases which frequently cause no end of trouble to the refractionist; and when properly understood and recognized early, our analysis will be more accurate, and consequently with the final results obtained, more successful.

Hysteria—Field Signs:

1. Reversal of fields. Hysteria may show a reversal of fields. In a true reversal, the color fields will be reversed no matter in what order they are charted. Such a condition is typical of hysteria and may or may not be acompanied by a contraction of the form field.

2. Tubular Fields. Another type of field, known as the "tubu-



J. Wolff. Figure 17.

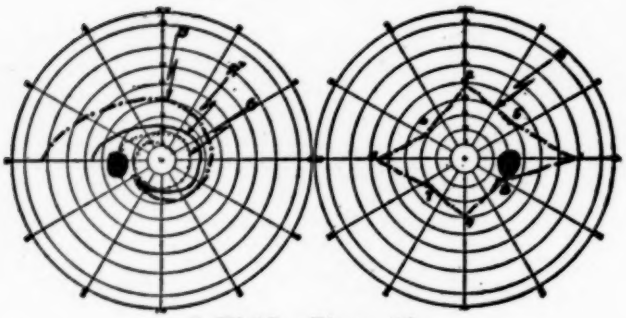
lar field," is found only in hysteria (See Fig. 17). In this field there is contraction for form (circular in type), which encroaches quite closely to the central fixation spot, and the field will remain the same size, whether tested at ½ meter, one meter, or other distances. In these cases the color and form fields are usually of the same size. The hysterical field is a constant field, showing no variation while being taken unless influenced by suggestion. (These patients being quite susceptible to suggestive influence, it is best to guard against this during the tests; in fact, it is wise to do so in all cases except for experimental purposes.)

3. The form and color fields may be contracted very markedly and yet the ophthalmoscopic examination will be negative, if the case is one of true uncomplicated hysteria.

4. The field contraction may be accompanied by a small central or annular (ring) scotoma.

5. The visual acuity of hysterical patients is usually quite good, with the exception of those occasional types in which a small central scotoma may appear.

Neurasthenia. The typical characteristic of a neurasthenic patient is the element of fatigue, both mental and physical. Anything they do wears them out in a very short time. This fatigue element is typical of the field also. The neurasthenic shows rapidly diminishing color fields as the test proceeds (See Fig. 18). The color in the test object may be recognized at the normal distance when it is brought from the periphery toward the center the first time, but each subsequent excursion requires a greater distance inward before the color is recognized. Thus if the color fields are taken in their regular order, there will probably be a reversal; therefore it is best to recheck, using colors in their reverse order. If the reversal still occurs when the colors are taken in this reverse manner (blue first, then red, and lastly, green), the case is likely to be one of hysteria rather than neurasthenia.



J. Wolff. Figure 18.

In field testing, patients should always be put at ease. Say nothing while making tests that would have a tendency to cause worry or fear. The psychologic effect of the operator's tone of conversation is an important consideration in handling the hysterical and neurasthenic patient; in fact, all cases.

Fatigue Fields. It might be well to stress the fact that fields should not be taken while a patient is excessively weary, either physically or mentally (unless as a matter of experiment you wish to ascertain the effect such fatigue has upon the fields), for overwork, long motor trips, worry, etc., slows down the functioning of the entire physical and mental being. If the brain is sluggish, vision will likewise be sluggish, for vision is recorded in the brain, and no matter how clear the media of the eye may be or how healthy the eye-ground, if the body be overfatigued, the poisons cannot be carried off as they should and a field examination will present the picture of a toxic condition.

Fig. 17 shows a typical hysterical field of the tubular type. The patient had a visual acuity of 20/20. The fields showed the same contraction with the large test object as with the small. There was no change in the size of the field when tested at 1/3, 1/2 or 1 meter distances.

Fig. 18 represents fields that are typical in neurasthenia. The right eye shows a star-shaped field—the test object being moved from periphery to center in each instance corresponding in order with the numbers shown. This really would be a spiral field, if we had charted it in the usual manner—by starting at one point and continuing on around until the starting point is again reached. The left eye having been tested in the usual manner, shows the typical spiral effect.

In our work it is important that we actually "know" the eyes we are dealing with. Much satisfaction develops in one's work when it is possible to really understand underlying conditions.

DR. J. WOLFF,
508 FERNWELL BLDG.,
SPOKANE, WASH.

OPTOMETRY'S EDUCATIONAL PROBLEM*

R. M. Peckham, Opt. D., F. A. A. O.
Rochester, N. Y.

Comparing the $25 correspondence courses of twenty-five brief lessons and the $50 attendance courses of three weeks at some school for watchmakers or the free ten-day instruction courses given with the purchase of a trial case that constituted optometry's sole educational facilities twenty-five short years ago with the solidly established schools of today with their quite difficult two-year, three-year or four-year courses, we are impressed with, rather surprised at, the width of optometry's forward leap in those two decades. For this movement has gone forward so steadily, with so little friction, that in the midst of it we were unconscious of its momentum and speed.

Still, though we rightfully congratulate ourselves on the amount of ground so quickly covered, we have not yet attained those standards of educational requirement, of professionalism in environment and practice that meet the criterion established by a public growing daily more critical, more exacting in its demands on those who seek its favor.

It is not a standard that we set for ourselves that determines our success, professional and financial, but our conformation with what our present public demands. Our synchronous growth with the public's ever-increasing exactions will determine whether we shall persist in the occupation of the field we claim for our own or whether we shall be retired and supplanted by some other group that will more closely meet the ideals and requirements of the public of the future. The market is ever changing. That business or that profession succeeds that is on the alert and adjusts itself to the changing market. More than that, the changes must to a large degree be forecast. We must so carefully attune our march that it does not lag behind, nor step too far ahead.

In our own ranks, we have some who admittedly are advancing more rapidly than the forward movement of the mass of the public.

*An abridgement of the material presented before the American Academy of Optometry at Omaha, December 15, 1930.

But these advanced scouts are but keeping pace with the advanced portions of the public and so are prospering, on the whole rather better than the majority of our practitioners. We have also a very large group who are lagging so far behind that they are suffering financially. To these we should bring some assistance, if we can find what will most help them and an efficient method of getting the sadly needed aid to them. This we have to do for our own self protection, that the public may appreciate that we are in fact moving forward with the general advance. For perchance the public's view of the main body is obstructed by the presence of the stragglers and laggards. So the general motion forward is not only too much retarded by waiting for the laggards to catch up, but the public's sight of the driving energy impelling optometry onward is somewhat obscured by the more visible surrounding cloud made up of those who are conducting their practice in conformation with the standards of yesterday, not having foreseen the change in public requirements that was bound to take place, in many instances not even having realized that a change has occurred.

As in every field of human activity, we have some who are planning for tomorrow, even living in tomorrow, many who are only living in today and do not foresee tomorrow's demands, many who are still living in yesterday. We must realize that in each generation in every branch of human thought and life there are some who are ahead of the mass and that the ideas and ideals of these few eventually become the ideas and ideals of the mass, while a new group will then arise with advanced thought, perhaps contemporaneously rejected but finally dominating the world. The radical thoughts of today become the commonplace of tomorrow, after they have been sifted by experience and molded by trial. So we must keep an eye on the advanced in our environment as well as on the mass, knowing that tomorrow we must conform with the new opinions and new customs of a new mass.

Our progress is really not so much measured by absolute comparison of what we were with what we are as it is to be gauged relatively with the general advance of all lines. If we have moved forward in synchronism with other professions and occupations, we are all right. If we have not, then we are behind and will suffer in proportion. It is this relative comparison that makes us fearful that our own mass movement is too slow, that we may be lagging behind the rest of the world. If this is true, then our preservation demands that we find out what is our trouble. That cannot be so easy, nor will there be much agreement among us as to diagnosis or prognosis.

Inasmuch as we have to deal with a public that is growing more and more professionally conscious, that is becoming each day more determinedly exacting in its demands as to the training of those to whom it looks for hygienic care of every kind and as to the environment in which it will seek that service, that is itself raising its standards of general education and so becoming more discriminating, there is no

disagreement among us that one of the very vital problems to which we must give very careful thought is the theoretic and practical education of our practitioners. This same public is responsible for the constantly increasing educational requirements in medicine, dentistry and other professions. A superficial observer might think that these advances come from within those professions, but they are not autonomic, they are reflex responses to pressure from without, from the demands of the public for better service. If the practitioners in any field fail to respond to that pressure, then another group will arise that, by giving the public what it demands, will occupy that field, turning out the old unresponsive group. And that is optometry's danger, that too large a majority may not advance rapidly enough to meet the advanced requirements of the public.

Nor is the situation to be met by our conforming to the standards that some profession found adequate for yesterday. It is today's and tomorrow's demands that we must confront. By that, I refer to those who ask why the optometrist's training should be longer than two years since only a few years ago medicine itself required but two or three years. But that was because the public of that day was content with physicians who had but that much training while today it will not accept them. A few years ago there was a movement started to reduce the educational requirements of physicans in order to increase their numbers. The movement fell flat for there came the realization that such shorter training would not produce physicians able to deliver to the public the service it requires today. We simply have to agree with those who foresee longer and longer training periods for the optometrist. The only question before us on that score is how soon we shall be forced into it, whether or not our continued existence and present prosperity depend on an immediate lengthening of courses by legislative enactments of higher standards. Really, the question is being automatically solved for us just as it was solved by other professions. The legal requirements for entry into the practice of medicine and dentistry are far below the educational facilities offered by their schools and required for graduation. They have, as we have, schools of different classifications, some giving much longer courses than others. It is not their schools with the lowest requirements and the shortest courses that register the most students, for professional experience has demonstrated that the short course graduates are not succeeding financially. Today, they have no schools that give just enough training to meet the statutory requirements of even the most advanced states. The short course laws exist, but there are no short courses given. There are abundant signs that we are now entering the same phase. More and more of our students, each year, voluntarily elect to take longer courses than the states in which they contemplate practicing require.

It should be a self evident truth, requiring no argument, that if optometry wishes recognition as a profession by the public and by other professions, its standards of education and of practice should

be on a par with those of other recognized professions as they are in effect today and that in the future the same standards must be maintained as other professions may arise to. Never can one profession alone maintain a lower standard, of education, of practice, or of the environment in which its practice is conducted, than that standard effective among other occupations that the public generally recognizes as professional in contrast to trade.

Further, optometry must produce and deliver, as the work of optometrist with proper background of adequate preliminary training, some contribution of definite and permanent value to the world's stock of experimental knowledge, as the result of properly conducted experimental research—research conducted in such environment that it can be formally presented under the name of "optometric research." Up to this time, optometry has produced nothing of this sort.

The same law of supply and demand that controls the success or failure of any undertaking, operates in education, whether that be in the popular fields or in specialized fields. There can be no doubt of a demand within optometry's ranks for education, but there is some doubt as to the demand for that which has been provided in various institutions. In our exuberant ardency, we seem to have attempted to force the demand by creating the supply. But, as will always occur in such attempts, no matter whether in commercial or educational fields, the probable demand will not be correctly judged in all its phases, so that in some qualitative details the material offered may not wholly satisfy the market. And this, it is quite possible, is more apt to be the reason why our university courses are not appealing so well to our prospective students and to the practicing optometrists as do the courses in the purely professional schools. It may not be the length of the courses, but the material offered in the courses, that is the reason for small registration in the university optometric courses.

As to length of courses necessary for the production of a competent optometrist, that depends on our conception of optometry. The head of one of our schools has insisted for years that two years is unnecessary. I do not know whether he has changed his mind recently or not. If an optometrist is merely an optician who fits glasses, one year is enough. If an optometrist is a professional man who strives to bring comfort to his patients, using lenses and prisms as one of the means to that end, then three or four years, perhaps more, are necessary. For we have definitely learned that he who undertakes what are commonly known as "Muscle Exercises" must have very considerable acquaintance in the realms of physiology and psychology (which does not mean in medicine). But if the optometrist is merely one who serves only the comparatively few who need nothing more than a pair of glasses with which to see better, then he needs neither the word "optometrist" with which to describe himself nor more than a few months of instruction in the trade. But we have learned that we have

to do far more than this fitting of spectacles to make our clients happy and to bring to ourselves financial success.

There is another aspect. Many untrained optometrists are fooling with subjects with which they have no moral or legal right to meddle. They do this because of their lack of training. Were they properly educated, they would know enough not to try to enter the practice of acknowledged medical specialties by the back door. The field of legitimate optometry is tremendously wide, so wide we have not visualized its borders. But never need it enter other fields than its own. These therapies and these medical tests that a few are meddling with, these are not a part of optometric practice and the optometrist well grounded in his physiology and psychology not only would not care to encroach on another specialist's ground but would not need to do so.

And again, the well educated optometrist, on a par with other specialists, would meet them on their own level and receive from them a degree of co-operation that is hard for the average optometrist of today to get. One technically trained man recognizes another technically man and respects him. If optometry is to gain the good will and respect of other professions, its training must be on a par with those.

(TO BE CONTINUED)

R. M. PECKHAM
11 MONTERY PARKWAY
ROCHESTER, N. Y.

AMERICAN JOURNAL OF OPTOMETRY

VOL. 9 JUNE, 1932 NO. 6

EDITORS

DR. CAREL C. KOCH
1501 Foshay Tower
821 Marquette Avenue
Minneapolis, Minn.

DR. JACK I. KURTZ
1501 Foshay Tower
821 Marquette Avenue
Minneapolis, Minn.

Original papers, scientific communications, clinical reports, society proceedings, books for review, and correspondence should be sent to the Editor, Dr. Carel C. Koch.

Annual Subscription, $3.00 in Advance, Canada and Foreign, $4.00.
Single Copies, 40c.

Copy of advertisements must be sent in by the tenth of the month preceding their appearance. Subscriptions, applications for single copies, communications with reference to advertising or other business should be addressed to the Business Manager, Dr. Jack I. Kurtz, 1501 Foshay Tower, Minneapolis, Minn.

Published Monthly by the
American Journal of Optometry Publishing Association.

The Journal has no objection to the reprinting by other magazines of any of its articles, provided such reprints are properly credited to the American Journal of Optometry.

THE FIRST ONE HUNDRED ISSUES

The publication of the April, 1932 issue of the *American Journal of Optometry* commemorated the one-hundredth issue of this Journal. Started eight years and four months prior to the first of April, we found ourselves on that date, at a sort of a mile post: A convenient place to stop and review some of the accomplishments and some of the failures of the past. Suffice it to say that we are, at this time, by no means satisfied with the result. To be sure we have succeeded in a measure, yet in many respects we have fallen quite short of the goal set for this publication. Plans have miscarried from time to time and various disappointments have arisen yet we have been able to carry on largely through the splendid help we have received from so many of the foremost practitioners of optometry. To these men we wish once more to express our most sincere appreciation for the encouragement and help they have given us in the past and to also hope to merit even greater help in the years which are to come.

In reviewing the past we find among other things, that certain individuals have, from time to time indicated in their correspondence and

their talks with us the fact that in their opinion the editorial policy of the *American Journal of Optometry* was too broad. That too much space was devoted to extra-ocular tests—too much discussion of this or of that, not purely refractive. Physio-therapy for instance and particularly Electro-therapy as used by optometrists seemed to be among a small group quite a "bone-of-contention." This later therapy has particularly been held up to ridicule by certain individuals who are not in sympathy with its use.

Because of these critics, few though they be, the writer decided to check back on the contents of the Journal using the first one hundred issues as a basis for a statistical study as to the content matter published from month to month. From the editors' standpoint it would indicate, in a measure at least, just how close we were following the policy set down more than eight years ago and from the readers' standpoint it would enable him to review, in a sense, the written "feast" we have been serving him from month to month and from the standpoint of our critics it would either sustain or refute their claims as to our leanings, or our looseness of editorial policy.

A check of the first one hundred issues was therefore made, and it was found that 669 original papers had been published. These varied in length from one to thirty-six pages and in each case were originally offered to the profession through this medium.

These 669 original papers were next divided into two groups. First those dealing with a technical subject. For instance, a Diagnostic procedure, a Case report, a Refractive test, a paper dealing with a refractive abnormality or a muscular condition or a pathologic one or a myologic treatment technic. In other words the first group dealt with scientific and technical subjects only. The second group was entirely composed of non-technical papers. In this group was placed all manuscripts dealing with problems of optometric sociology and economics as well as papers dealing with optometric education.

In this original classification of technical and non-technical papers the results were as follows:

SUBJECT	Number of Papers
Technical Papers	551
Non-technical Papers	118
Total	669

Computing these on a percentage basis the results were:

SUBJECT	Approximate per cent of the total
Technical Papers	82.2%
Non-technical Papers	17.8%
Total	100%

It will therefore be seen that a little more than 80% of the contents of the *American Journal of Optometry* has, from the first, been of a technical nature. In this we have followed naturally the usual course as pursued by professional publications.

As far as the papers themselves were concerned we next divided them into seven arbitrary groups for the sake of subject or content analysis. These groups and the number of papers falling into each group are as follows:

SUBJECT	Number of Papers
Ocular Refraction	461
Optometric Sociology and Economics	75
Optometric Education	43
Ocular Pathology	42
Ocular Electro-therapy	24
Physical Therapy other than electrical	15
Extra-ocular Tests	9
Total Number of Original Papers	669

The same classification on a percentage basis is as follows:

SUBJECT	Approximate per cent of the total
Ocular Refraction	68.8%
Optometric Sociology and Economics	11.2%
Optometric Education	6.5%
Ocular Pathology	6.4%
Ocular Electro-Therapy	3.4%
Physical Therapy other than electrical	2.2%
Extra-ocular Tests	1.5%
Total	100%

It will be seen from the foregoing that nearly seventy per cent of the total contents of the first one hundred issues of the journal has dealt with technical subjects of purely refractive nature. In other words, while a little more than 80 per cent of all the original material in the Journal has dealt with some technical subject, seven-eighths of this has been written on matters of pure optometry. In subdividing the papers comprising the first classification on Ocular Refraction which comprise 68.8 per cent of the total number of papers published we find the results to be as follows:

SUBJECT	No. of Papers
Skiametric, Subjective and Diagnostic Tests and their interpretations; Case Reports; Papers dealing with hyperopia, myopia, astigmia, presbyopia, etc.	262

Phoria and Duction Tests and their interpretations; Accommodative and Convergence near-point tests; Case Reports; Papers dealing with convergence abnormalities; exophoria, esophoria, hyperphoria, etc.	62
Myologic treatment technics; Exotropia, Esotropia; The Treatment of Squint, etc.	73
Physiology of vision; Physiological Optics; Mathematical Lens Formulæ; Color Vision; Ocular Hygiene, etc.	64
Total	461

From the above figures it is evident that emphasis has been naturally directed towards the refractive side of optometric work as would naturally be expected. The results have so far shown that of 669 original papers published during the past eight years 461 papers or 68.8% of the total have dealt with subjects of refractive nature. One hundred eighteen papers or 17.7% of the total have dealt with optometric sociology, economics or education. The remaining 90 papers comprising but 13.5% of the total are divided as follows: Forty-two papers or a little more than 6% of the total deal with ocular pathology while 48 papers deal with Ocular physical therapy and Extra-Ocular Tests. Only papers falling in this later group are controversial.

In other words, but 7.1% of the total number of papers deal with subjects not in daily use by all optometrists. This small group of papers dealing with controversial subjects has been divided as follows: Ocular-Electro therapy, 24 papers or 3.4%. Physical therapy other than electrical, 15 papers or 2.2%. Papers dealing with Extra-ocular tests but 9 in number or slightly less than 1.5%. In comparing this group of controversial papers with the totals we find the following:

SUBJECT	No. of Papers
Optometric Subject matter	621
Controversial Subject matter	48
Total	669

Or on a percentage basis we find that the totals are:

SUBJECT	Approximate per cent of the total
Optometric Subject matter	92.9%
Controversial Subject matter	7.1%
Total	100%

This analysis therefore indicates clearly that no over-emphasis has been placed on the matter of ocular-physical therapy or extra-ocular tests

by the editorial policy of the Journal, despite the fact that this policy is favorable to both.

As a matter of fact we have always believed that optometrists should make use of all pertinent information which will assist them in more accurately diagnosing ocular refractive and neuro-muscular conditions and we have also believed that optometrists were not only justified but were obligated to prescribe any legitimate therapy for the relief of abnormal refractive or muscular conditions in the above mentioned fields. We have no apology to make on this stand as our policy in the past has been conservative and will remain conservative in the future.

That we will strive for greater perfection in the future; that we shall work harder to merit the confidence placed in us by our professional colleagues, is our pledge at this time and we look forward hopefully to many years of active effort in the educational field of optometry.

C. C. K.

BOOK NOTICES

1932 YEAR BOOK OF THE NEW YORK STATE OPTOMETRIC ASSOCIATION. Edited by Dr. D. K. Uttal, Dr. B. G. Rosenkrantz and Dr. William Feinbloom. Published by the New York State Optometric Association, 2472 Broadway, New York City. 272 pages. Illustrated. $2.00. 1932.

The 1932 Year Book of the New York State Optometric Association has just been issued. This year the volume is, in both appearance and contents, an improvement over any of the previous issues. In fact, Editors Uttal, Rosenkrantz and Feinbloom have become very proficient in this matter and have given the profession a very credible piece of work.

Twenty-seven short technical papers appear in this book. Among the outstanding of these are Diagnostic Routine Procedure by Dr. O. J. Melvin, Four Case Reports of Sub-Normal Vision by Dr. William Feinbloom, Possible Causes of Amblyopia and Strabismus by Dr. F. McFadden, Phoria and Duction Tests by Dr. N. Levin and Single Vision and Bifocal Lenses for a Case of Anisonetropia by Dr. Ivan S. Nott.

It is to be regretted that so much space was devoted to matters of economics and optometric sociology which naturally limited the space given to technical material and it is also regretted that the index was omitted as this omission makes it difficult to find important technical papers as these are scattered pretty well throughout the book. However, the work is vastly better than any of the previous volumes and will be welcomed by many optometrists as an interesting addition to their libraries.

C. C. K.

ANNOTATIONS AND SOCIETY PROCEEDINGS

The American Journal of Optometry is the Official Organ of the American Academy of Optometry, as well as the Organ of the Arkansas, Delaware, Indiana, Iowa, Maine, Maryland, Michigan, Minnesota, Nebraska, North Dakota, Oklahoma, Pennsylvania, South Dakota, Vermont and West Virginia Optometric Associations.

The following gentlemen have consented to supply items of interest from their respective sections, acting in the capacity of

ASSOCIATE STATE EDITORS

DR. E. B. ALEXANDER
Duncan, Okla.
DR. A. S. ANDERSON
Minot, N. D.
DR. J. F. ANDREAE
Baltimore, Md.
DR. O. E. BELL
Fairmont, W. Va.
DR. C. H. DEGRAFF
Monroe, Mich.
DR. L. P. FOLSOM
South Royalton, Vt.
DR. F. W. FREEMAN
Anderson, Ind.
DR. A. J. LARGE
Winona, Minn.
DR. J. J. LIVINGSTON
Little Rock, Ark.
DR. M. B. MEYER
Wilmington, Del.
DR. J. K. MORRIS
Erie, Penn.
DR. C. A. PERRIGO
Norfolk, Neb.
DR. D. E. PLAISTED
Lewiston, Me.
DR. H. N. SMITH
Sioux Falls, S. D.
DR. H. R. SPITLER
Eaton, Ohio
DR. A. P. WHEELOCK
Des Moines, Ia.

ANNUAL POST-GRADUATE COURSE

The Pennsylvania State College of Optometry is offering the profession its Third Annual Post Graduate Course to be held at the College the week of June 6th. This course is held as a result of many expressions of appreciation by visiting Optometrists of the wonderful week of post-graduate work given for the last two years by the Pennsylvania State College of Optometry. The Board of Trustees of the College decided last year to make this an annual feature, as its contribution to the profession which it serves.

There are to be no charges of any kind except for the get-together banquet, nor will there be any collection of funds whatsoever in connection with this week of post-graduate work. There will be suitable courses for every type of work that may be desired, and a certificate will be given for the week's attendance.

During the last two years every state east of the Rockies was represented and the enthusiasm of those who attended has spread to all parts of the country resulting in requests for this Annual Post-Graduate course from nearly every state in the Union.

Although the size of the College and its faculty is large, and the subjects many, so that a large number can be accommodated, it is thought best, for efficiency, to limit the number in order to permit smaller groups in classes. To carry out this plan, it will be necessary to make reservations as early as possible.

The following list of subjects offered will give some idea of the scope of the work to be covered, and will further show the opportunity each attending Optometrist will have of satisfying his desire to advance in some particular technique, and the i terpretation of some of the newer developments. There will also be an opportunity for those Optometrists with a desire for research work, to further their interest as new work in this direction will be presented.

The attending Optometrists will be at liberty to make his choice of that available group which he feels will be the most helpful. Those who are not thoroughly equipped with the actual instrumentation would perhaps obtain the greatest benefit from attending the first (a) group, and those who have been using the procedure in question should be chiefly interested in the second (b) group, while those Optometrists desiring work in the advanced related subjects should attend the third (c) group. All subjects are progressive. Additional subjects will be given each year so that attending Optometrists who complete the work in one class can move up into the next higher class, completing a thorough post-graduate course in the educationally accepted way.

The following is the list of those members of the faculty of the Pennsylvania State College of Optometry who will be the instructors in the third annual po.t-graduate course. Each member of the staff is a specialist who has given considerable time and effort to the study of the subject which he presents.

Albert Fitch, O.D., Professor of Optometric Practice
Edwin Forbes Tait, A.M. Ph.D., Professor of Optometry
Maxwell Herman, M.D., Professor of Pathology
Julius Neumueller, B.S., O.D., Professor of Geometrical and Physical Optics
Yale S. Nathanson, A.M., Ph.D. Professor of Psychology
Wilso S. Hankins, A.B., O.D., Professor of Chemistry
George A. MacElree Jr., O.D., Clinical Professor of Optometry
John C. Neill, O.D., Associate Professor of Ophthalmic Mechanics
Isador Kaplan, M.D., Asst. Professor of Anatomy and Physiology
William J. Tait, B.S., O.D., Instructor in Geometrical and Physical Optics
Arthur C. Whitaker, Jr., O.D., Instructor in Skiametry
Robert J. Beitel, Jr., A.B., O.D., Instructor in Psychology
Elbert M. Alderman, M.S., D.V.M., Instructor in Histology and Histological Pathology
John F. Morrow, Jr., O.D., Instructor in Orthoptics
William O. Vivian, O.D., Instructor in Clinical Optometry
S. Winfield Smith, O.D., Instructor in Clinical Optometry
T. Richard Simpson, O.D., Instructor in Clinical Optometry
Harold Simmerman, O.D., Instructor in Visual Field Work
Michael Curcio, O.D., Instructor in Ophthalmoscopy

Clinical and Laboratory Courses

COURSE	I	(a) External Examination Procedure
	I	(b) External Examination Interpretation
	I	(c) External Data in its Relationship to Other Findings
COURSE	II	(a) Keratometric Procedure
	II	(b) Keratometric Data Interpretation
	II	(c) The Nature, Calculation, and Correction of Lenticular Astigmatism
COURSE	III	(a) Ophthalmoscopic Procedure
	III	(b) Ophthalmoscopic Practice
	III	(c) Ophthalmoscopic Drawing Practice
COURSE	IV	(a) Static Skiametric Procedure
	IV	(b) Dynamic Skiametric Procedure
	IV	(c) Skiametric Data Interpretation
COURSE	V	(a) Ocular Muscle Procedure
	V	(b) Ocular Muscle Analysis
	V	(c) Ocular Muscle Correction
COURSE	VI	(a) Histology Laboratory
	VI	(b) General Pathology
	VI	(c) Ophthalmic Pathology
	VI	(d) Clinical Ophthalmic Pathology
COURSE	VII	(a) Visual Field Technique
	VII	(b) Visual Field Interpretation
	VII	(c) Visual Fields in Glaucoma
COURSE	VIII	(a) Elementary Chemistry of the Body
	VIII	(b) Physiological Chemistry
	VIII	(c) The Chemistry of Muscular Actions
COURSE	IX	(a) Experimental Visual Psychology
	IX	(b) Application of Psychological Principles

Lecture Courses

COURSE	X	Office Practice
COURSE	XI	Illumination Problems and Procedures
	XII	Luetic Manifestations in Ocular Work
	XIII	Theory of Dynamic Skiametry
	XIV	Convergence Accommodation, Its Measurement and Use
	XV	Mechanical Ptosis Correction

THE PASCAL PHOTOSCOPE

The Pascal Photoscope, a new instrument for simplifying static retinoscopy and overcoming the handicaps to precise findings is announced. This instrument was developed by Joseph I. Pascal, M.A., M.D., and perfected during six years of progress in this country and at the University of Vienna. American Optical Company is manufacturing and distributing the instrument, working with the co-operation of Dr. Pascal.

The Photoscope is an auxiliary instrument to the retinoscope and provides a definite fixation target to obtain fixation at infinity, complete relaxation of the eye; and also to obtain the retinoscopic reflex from the fovea or macular area precisely along the visual path.

In this way, the Pascal Photoscope provides constant fixation for the patient, superseding the method of fixing on a distant object beyond the observer's eye, a method which naturally induces inconstant relaxation as well as variable angles between the observation of the refractionist and the fixation of the patient's eyes.

* * *

MASSACHUSETTS BOARD OF REGISTRATION

The Massachusetts Board of Registration in Optometry will hold its next examination on June 21st, 22nd, 23rd, and 24th, 1932, at the State House, Boston, Mass. Applications for examination should be on file at the office of the Secretary, Room 141, State House, at least ten days before date of examination.

* * *

WEST VIRGINIA ASSOCIATION

The annual meeting of the West Virginia State Association was held at Huntington, on May 15th and 16th. Dr. W. T. Eisensmith lectured on "Practical Optometry" and Dr. C. C. Wilson spoke on "Ethical Publicity." Dr. O. E. Bell was elected President; Dr. L. G. Stortz, Vice President; Dr. T. P. Field, Secretary and Treasurer, and Dr. C. C. Wilson, Publicity Director.

* * *

HENRY LOMB MEMORIAL

A magnificent service took place on Memorial Day at the dedication of a monument to the memory of Captain Henry Lomb at the Lomb Memorial Park at Rochester, N. Y. Mr. F. T. Davidson, Assistant Secretary of War, dedicated a monument before 40,000 persons. Many civic and military organizations paid fitting tribute to the memory of the soldier, industrialist and philanthropist, Henry Lomb, one of the founders of the Bausch & Lomb Optical Company.

BETA SIGMA KAPPA

The International Honorary Fraternity, Beta Sigma Kappa, will hold a Luncheon meeting on Wednesday, June 29th, at the Statler Hotel. All members attending the A. O. A. Convention are urged to attend this fraternity luncheon.

* * *

GRADUATE CLINIC FOUNDATION

During the past several weeks a large number of vigorous protests have been received by the American Journal of Optometry, relative to the criticism of Dr. A. M. Skeffington, Chairman of the Graduate Clinic Foundation and the work of the Study Groups which are meeting throughout this continent. It is obviously impossible to print these many protests due to a lack of space, but the following quotation from a resolution by D. C. E. Ebeling, President of the Missouri Optometric Association, is typical of many which we have received.

"We, the members of the ST. LOUIS SOCIETY OF OPTOMETRISTS and STUDY CLUB, a group started over six years ago, who have been followers of the GRADUATE CLINIC FOUNDATION work since, hereby resolve that the benefit to Optometry in St. Louis has been absolutely priceless."

The San Francisco Group will hold its regular meetings on the second and fourth Tuesday of each month in the Assembly Hall of the Phelan building, at 7:30 p. m. A review class, which covers the elementary work to enable new members to grasp the work done by the main group, meets on the first and third Tuesday of each month in the office of Chairman Dr. C. V. Lyons, 210 Post street, at 7:30 p. m.

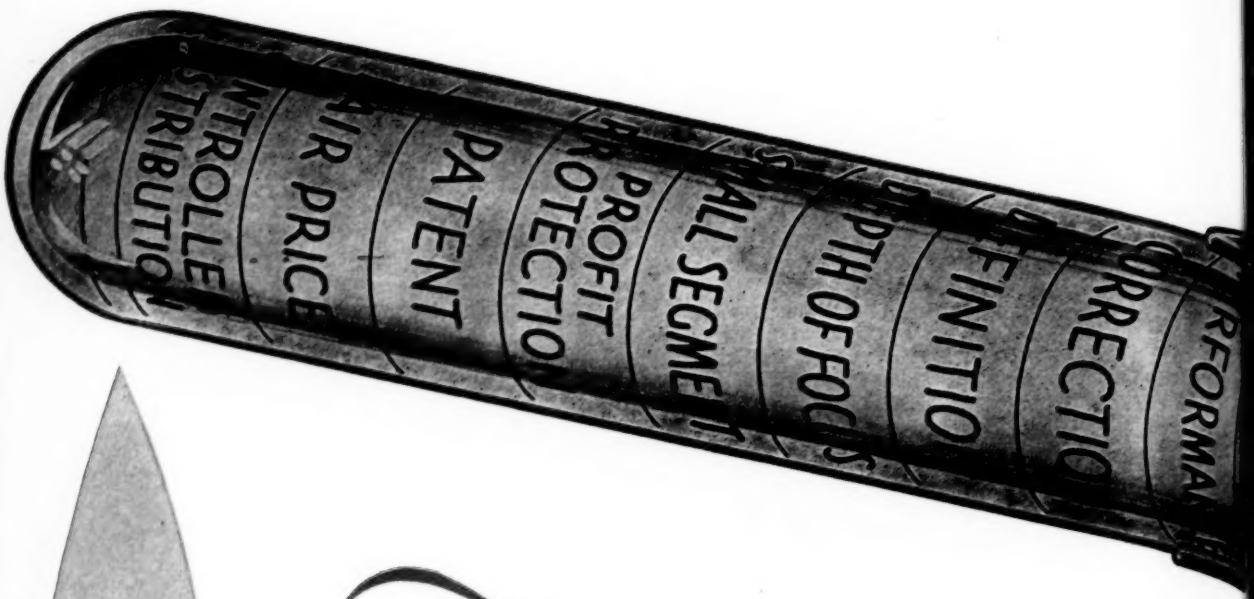
The Study Group of Orange County, Cal., meets regularly on the first Monday of each month, under the direction of Dr. D. R. E. Waters of Santa Ana.

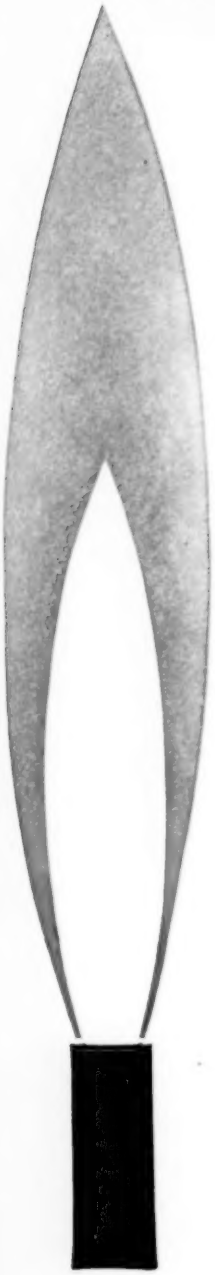
The Central District Oklahoma Association will have its next meeting at Wewoka, on June 12th. The following meetings will be held at Chandler on July 10th, at Holdenville, August 14th, and the last summer meeting will be held at Norman on September 11th.

* * *

PINE TRAINING CARDS

The Professional Press, 17 North Wabash avenue, Chicago, Ill., has just issued a set of stereoscopic fusion training cards as devised by Dr. R. E. Pine, Optometrist of Chicago, Ill. In many respects these cards are similar to those published by Drs. Wells and Javal, although several new ideas have been introduced by Dr. Pine. Cards of this character are beneficial for neuro-muscular treatment work.





The acid test says

ORTHO

The acid test for any bifocal is your own experience. You, better than any one else under the sun, know what a bifocal should do, what your patients should have in a bifocal lens.

You, better than anyone else, know that first of all a bifocal must be **inconspicuous.** In your own experience how many do you know who should be

BAUSCH & LOMB

230